

## ABSTRACT

The present invention provides improved synthetic polymer hydrogel permeation layers for use on active electronic matrix devices for biological assays. The permeation layers have a defined porous character, with mesopores in a size range between about 100 nanometers and about 1000 nanometers, and may also have micropores in the micrometer size range. The mesoporous synthetic hydrogel permeation layers demonstrate improved signal intensity and linearity characteristics as compared to nanoporous synthetic hydrogel permeation layers on active electronic matrix devices. In addition, the present invention also provides synthetic polymer hydrogel permeation layers which contain copolymerized attachment sites for nucleic acid probes or other biomolecules.